Serial No. 10/803,087
Docket No. PHCF-04015
HIR.096

REMARKS

Entry of this Amendment is proper under 37 CFR §1.116, since no new issues or claims are presented and the only claim amendments attempt to find wording acceptable to the Examiner for immediate allowance, rather than proceeding to Appeal.

Claims 1, 3-6, 8, 9, 11-14, and 16 are presently pending in the application.

It is noted that Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

The rejection currently of record does not repeat the rejection for claims 1-16 under 35 USC §112, first paragraph, and under 35 USC §112, second paragraph, of the previous Office Action. Therefore, although this latest rejection fails to expressly state so, Applicants understand, because of the lack of their repetition, that these rejections have been withdrawn and that there is no need to further modify claims for purpose of addressing issues related thereto.

Claims 1, 3-6, 8, 9, 11-14, and 16 stand rejected either under 35 USC §102(b) as being anticipated by US Patent 5,592,581 to Okase or, alternatively, under 35 USC §103(a) as unpatentable over Okase.

Applicants respectfully disagree.

THE CLAIMED INVENTION

As described in, for example independent claim 1, the present invention is directed to semiconductor film formation device. A reaction vessel includes a gas flow path to allow a source gas to pass through, and a substrate mount site upon which to mount a substrate is provided in the gas flow path inside the reaction vessel along a side thereof. A heater is disposed outside of the reaction vessel on the side along which the substrate mount site inside the reaction vessel is mounted. A cooling device is disposed outside of the reaction vessel on the side substantially directly opposite to the heater, the cooling device controlling an internal temperature of the reaction vessel in a first section of the gas flow path where the substrate

mount is located.

A thermal conductivity adjusting member is disposed between the reaction vessel and the cooling device. The thermal conductivity adjusting member allows the first section along the gas flow path where the substrate mount is located to have a thermal conductivity different from that of a second section along the gas flow path, in order to lower a thermal diffusion effect of the source gas in the first section.

In another aspect of the present invention, a semiconductor film formation device as described in, for example claim 6, includes a semiconductor film formation device including a reaction vessel that includes a gas flow path to allow a source gas to pass through and a substrate mount site on a side of the reaction vessel to mount a substrate in the gas flow path.

A heater is disposed outside of the reaction vessel on the same side of the reaction vessel as the substrate mount site is located, the heater thereby being close to the substrate mount site. A cooling device controls an internal temperature of the reaction vessel in a section of the gas flow path wherein the substrate mount site is located, the cooling device being disposed outside of the reaction vessel on the side opposite to the heater.

A wall thickness of the reaction vessel is smaller in the section along the gas flow path where the substrate mount site is located, thereby forming an interspace between the reaction vessel and the cooling device to lower a thermal diffusion effect of the source gas in the section of the gas flow at the location of the substrate mount site.

The prior art of record fails to satisfy the plain meaning of the description of even these independent claims, as that the language would be interpreted by one having ordinary skill in the art.

THE PRIOR ART REJECTION

The Examiner alleges that Okase either teaches or renders obvious the present invention defined by claims 1, 3-6, 8, 9, 11-14, and 16, as shown in Figure 7.

However, Applicants submit that Okase, even under the Examiner's strained interpretation and even with the previous wording and even prior to the wording change of the present invention, fails to satisfy the plain meaning of the claim language of the

independent claims, as one of ordinary skill in the art would interpret this language.

First, relative to independent claim 1, the Examiner considers that the heat insulating members 72 described at lines 53-56 of column 9 to be both a component of the "processing vessel" and a "thermal conductivity adjusting member". However, such interpretation contradicts the plain meaning of the claim language, wherein these are clearly described as being two distinct components.

More important, the description at lines 53-61 of column 9, to which the Examiner points, contains no suggestion that the heat insulating members 72 provide the function described by the plain meaning of the descriptive terminology "thermal conductivity adjusting member". That is, this "ceramic wool" structure of Okase merely serves as insulation; there is no suggestion of the function of adjusting thermal conductivity in different sections of the structure, as required by the plain meaning of the claim language.

Applicants submit that, to one having ordinary skill in the art, the terminology "ceramic wool" does not convey a meaning of different sections of the structure that provide a feature of different thermal conductivity and does not convey a meaning of different sections of the gas flow path having different thermal conductivity. The Examiner's strained interpretation that a "wool" structure having "interspaces", understood as attempting to suggest that the interspaces would have a thermal conductivity different from the ceramic material, still fails to satisfy the plain meaning of the claim language, since this different thermal conductivity would inherently be present throughout the heat insulating members' structure. There would be no distinct sections of this heat insulating members' structure to which the Examiner can point as satisfying the requirement that this section has a lower thermal conductivity than another section of the heat insulating members.

Second, even if the Examiner were to consider the "processing vessel" and "thermal conductivity adjusting member" as being a single component in Okase (e.g., the heat insulating members 72), then inherently this single component would clearly fail to satisfy the plain meaning of the description in the claim limitation that the "... thermal conductivity adjusting member ... is disposed between the reaction vessel and the cooling device ....", since the heat insulating members 72 cannot be disposed between itself and the cooling devices 75.

Third, as mentioned briefly above, the Examiner's interpretation that the ceramic wool has "... void spaces resulting in variable conductivity ...." fails to satisfy the plain meaning of even the previous claim limitation wording: "... wherein the thermal conductivity adjusting member comprises a first section with a thermal conductivity different from a section other than the first section *along the gas flow path* to lower a thermal diffusion effect of the source gas in the first section."

To satisfy this description, the Examiner needs to point to a specific section of the heat insulating member 72 along the gas flow path that has the different thermal conductivity than another section of the heat insulating member 72. There are no such distinct sections in the apparatus shown in Figure 7 or in the description at lines 53-61 of column 9.

Even though Applicants believe that the original claim wording clearly distinguished from Okase, they have amended the claim wording to attempt to find wording that is perhaps more acceptable to the Examiner.

Moreover, Applicants submit that the problem that the Examiner gets into with this approach is that the word "section" becomes equivalent to "thermal conductivity adjusting member", thereby further defeating the plain meaning of using different words in the claim language, which the Examiner construes as all being equivalent. Applicants submit that such arbitrary equivalence of words destroys the ability of language to communicate, including the defeat of the purpose of claim language.

Fourth, the cooling jacket 75 of Figure 7 of Okase is not used "... to control an internal temperature of the reaction vessel ...." Rather, as clearly described at lines 59-61 of column 9, the "... water cooling jacket 75 insulates heat between the heat treatment apparatus 60 and the outside thereof", a concept different from that of controlling the internal temperature.

Fifth, in the present invention, the cooling device and heater are both outside the reaction vessel and are on opposite sides to each other.

Sixth, independent claim 1 defines that the substrate mount site is along the side of the reaction close to the heater. The mount 2 in Okase is clearly in the center of the reaction vessel.

Hence, turning to the clear language of the claims, in Okase there is no teaching or

suggestion of: "...a reaction vessel that includes a gas flow path to allow a source gas to pass through, a substrate mount site upon which to mount a substrate being provided in the gas flow path inside the reaction vessel along a side thereof; a heater that is disposed outside of the reaction vessel on the side along which the substrate mount site inside the reaction vessel is mounted; a cooling device that is disposed outside of the reaction vessel on a side substantially directly opposite to the heater, said cooling device controlling an internal temperature of the reaction vessel in a first section of the gas flow path where the substrate mount is located; and a thermal conductivity adjusting member that is disposed between the reaction vessel and the cooling device, wherein the thermal conductivity adjusting member allows the first section along the gas flow path where the substrate mount is located to have a thermal conductivity different from that of a second section along the gas flow path, in order to lower a thermal diffusion effect of the source gas in the first section", as required by independent claim 1.

Relative to the rejection for independent claims 6 and 14, there is no difference in wall thickness in the reaction vessel shown in Figure 7 of Okase. Applicants request that the Examiner point out a specific area that satisfies the plain meaning of this description, since it is submitted that the "ceramic wool" composition of the heat insulating members 72 does not provide an inherent difference in wall thickness, as the Examiner implies.

Relative to the rejection for independent claims 9 and 14, there is no reasonable accounting in the rejection currently of record for a "plate member" such that the thermal conductivity adjusting member is between the plate member and the cooling device. Interpreting the heat insulating members 72 as serving as both "plate member" and "thermal conductivity adjusting member" fails to satisfy the plain meaning of "between".

Relative to the rejection for claims 3 and 11, as best understood, the Examiner considers the "ceramic wool" of the heat insulating members 72 has "interspaces" and such interspaces define "sections" along the gas flow path having different thermal conductivities. Applicants submit that this interpretation makes no sense, since the "interspaces would be co-located throughout the entire length of the heat insulating members such that there would be no "section" distinct from another "section", let alone sections having different thermal

conductivities (if for no other reason than all interspaces would have the same thermal conductivities).

Moreover, as mentioned above, such interpretation fails to satisfy the plain meaning of the language "... an interspace formed between the reaction vessel and the thermal conductivity adjusting member."

Relative to the rejection for claims 4, 8, 12, and 16, wherein the Examiner is understood as suggesting that the "interspaces" of the "ceramic wool" of the heat insulating members 72 somehow provide a variation in height along the gas flow path, Applicants submit that there is no indication of a height variation along the gas flow path in Figure 7 and that the interpretation fails to satisfy the plain meaning of the claim language since the interspaces can only be considered as internal structural features that would not affect height as a measurement relative to other structure external to the heat insulating members 72.

Relative to the rejection for claims 5 and 13, wherein the Examiner is understood as suggesting that the "interspaces" of the "ceramic wool" of the heat insulating members 72 are considered as one material and the ceramic is the second material, Applicants submit that "interspaces" would be empty and, therefore not qualify as a "material", thereby failing to satisfy the plain meaning of the claim language.

Therefore, Applicants submit that one having ordinary skill in the art would consider that there are multiple significant difference between the invention and Okase, even given the Examiner's strained interpretation of Okase.

The Operation of the Present Invention Relative to Okase

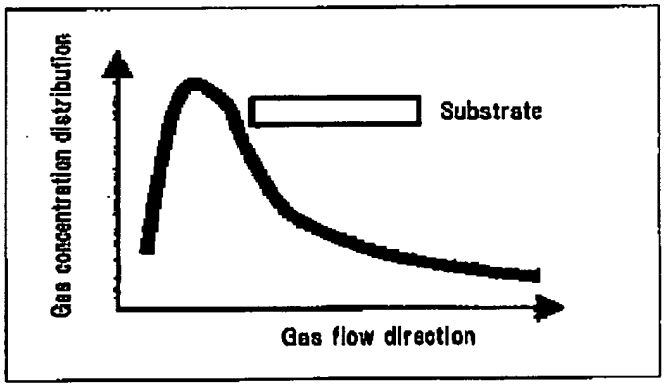
As explained in the previous Amendment, Okase aims at heat treating a work piece with an equal temperature distribution on the entire surface of the work piece by its heat treatment apparatus (col.1, line 61 to col.2, line 2).

In contrast, the present invention aims at changing the source gas distribution by controlling the thermal diffusion effect of the source gas in a specific section so as to form a semiconductor film with an excellent evenness in thickness and composition ratio on a substrate.

In other words, the invention does not always concentrate on the equal temperature distribution on the entire surface, as is the purpose of Okase.

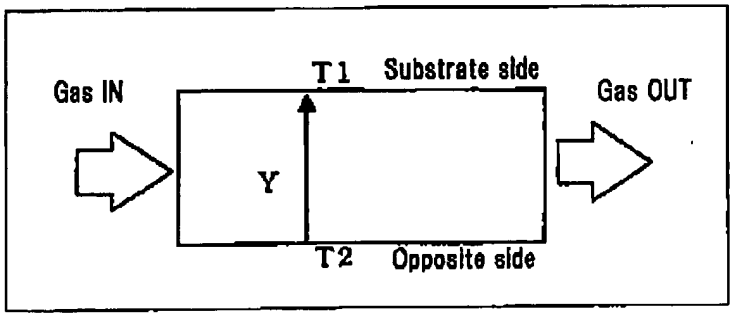
The concept of the invention is explained as follows.

In a typical CVD (or MOVPE) apparatus, a source gas is reacted and deposited on the way (e.g., inner walls or opposite surface to a substrate) to a substrate along the gas flow direction. Thus, the source gas begins to be consumed gradually from the upstream (or inlet of the reactor vessel) and thereby a gas concentration distribution as shown below is generated necessarily along the gas flow direction.

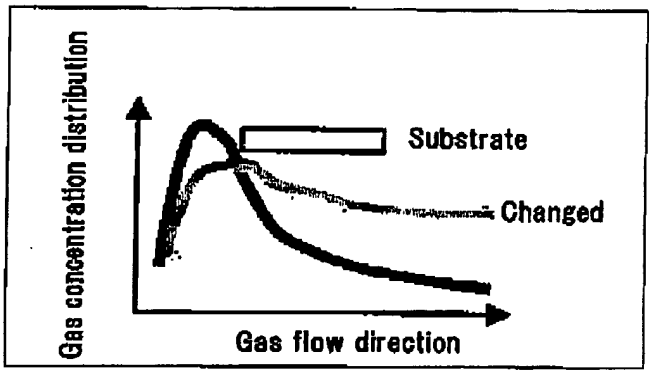


Such a gas concentration distribution results in an uneven thickness and composition ratio.

In the invention, the gas concentration distribution in Y direction as shown below can be improved by controlling the thermal diffusion effect based on a temperature difference (T1-T2) between substrate temperature (T1) and opposite surface temperature (T2).



Namely, T2 can be changed by controlling the thickness or material of the opposite surface. Then, the thermal diffusion effect varies based on the temperature difference (T1-T2). As a result, the gas concentration distribution can be improved as shown below (with a light-colored curve).



As explained above, in the invention, the gas flow distribution can be controlled by changing the opposite surface temperature without controlling the surface temperature of substrate, as in Okase.

CONCLUSION

In view of the foregoing, Applicant submits that claims 1, 3-6, 8, 9, 11-14, and 16, all the claims presently pending in the application, are patentably distinct over the prior art of record and are allowable, and that the application is in condition for allowance. Such action would be appreciated.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below to discuss any other changes deemed necessary for allowance in a telephonic or personal interview.

To the extent necessary, Applicant petitions for an extension of time under 37 CFR

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§1.136.

The Commissioner is authorized to charge any deficiency in fees, including extension of time fees, or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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CERTIFICATION OF TRANSMISSION

I certify that I transmitted via facsimile to (571) 273-8300/-1442 this Amendment under 37 CFR §1.116 to Examiner R. Zervigon on March 29, 2006.

3/29/06

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